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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/768,301	01/25/2001	Sang Kyun Cha	K-254	4139

34610 7590 10/05/2004

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EXAMINER	
TO, BAOQUOC N	

ART UNIT	PAPER NUMBER
2162	

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/768,301	CHA ET AL.	
	Examiner	Art Unit	
	Baoquoc N To	2172	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Prosecution Application

1. The request filed on 08/16/04 for a Request For Continued Examination (RCE) under 37 CFR 1.53(d) based on parent Application No. 09/768,301 is acceptable and a RCE has been established. An action on the RCE follows.

2. Claims 1-27 are pending in this application.

Response to Arguments

3. Applicant's arguments filed 08/16/2004 have been fully considered but they are not persuasive.

The applicant argues that "Bordsen et al. does not teach or suggest (1) undoing updates of uncommitted transactions by XOR operations, and (2) applying (redoing or undoing) log records in the order independent of log creation."

The examiner respectfully disagrees with the above argument. As Bordsen states "in case of a failure during the update of the database, the audit copy can be used to update the database. This recovery action is called a Roll-Forward of the transaction) (col. 8, lines 39-42) which is corresponding to the redoing update. In addition to, (if there is a failure during the write to the audit media, the database is unaltered during the audit media, the database is unaltered and there the old before image-look image is still good. In this case, the transaction is called a Rolled-Rack word recovery, and update must be retrieved" (col. 8, lines 42-46) is the undoing the log records. The undoing log records in the order independent of log creation is just the before look image. At this point, the examiner does not see the different from the claims limitations and the cited references. Although, the

applicant tried to distinguish by using the examples and explanations which included in the remarks and specification; however, it is not in the claim language (e.g. the differential log records and the log records are applied in a sequence independently from the order of the log creation.)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 24-25, 34 and 37are rejected under 35 U.S.C. 103(a) as being unpatentable over Bordsen et al. (US. Patent No. 5,193,162).

Regarding on claims 1, 24, and 34, Bordsen teaches a method of logging recovery in a transaction system having main a memory for storing a database, one or more persistent backup storage devices for storing a copy the data in the main memory, and one or more persistent log storage devices for storing log records for parallel logging and parallel recovery, the logging method comprising:

Generating different log records by applying bit-wise exclusive-OR (XOR) operation between a before-update image and an after-update image (col. 11, lines 29-33), and

The recovery method comprising:

Redoing updates of committed transactions by applying the bit-wise XOR operation between the differential log records read from said one or more persistence log storage devices and the copy of the database read from said one or more persistence backup

storage devices (in case of a failure during the update of the database, the audit copy can be used to update the database. This recovery action is called a Roll-Forward of the transaction) (col. 8, lines 39-42); and

Undoing updates of uncommitted transaction by applying the bit-wise XOR operation between the differential log records read from said one or more persistence log storage devices and the copy of the database read from said one or more persistence backup storage devices, wherein the log records are applied in a sequence independently from the order of the log creation (if there is a failure during the write to the audit media, the database is unaltered during the audit media, the database is unaltered and there the old before image-look image is still good. In this case, the transaction is called a Rolled-Rack word recovery, and update must be retrieved" (col. 8, lines 42-46).

Bordsen does not explicitly teach different log records by applying bit-wise exclusive-OR (XOR). However, Bordsen discloses "comparison of the before and after look in order to Roll-Forward (redo) and Roll-Back (undo) when updated is failure in the database" (col. 8, lines 35-45). This comparison process of before and after is the differential log in order to recovery data in the database at point in time. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to modify Bordsen's system to include the differential records from the comparison processes of before and after the image in order to recover the database at a point in time.

Regarding on claims 2 and 25, Bordsen teaches the database comprises a plurality of fixed-size pages (pages) (col. 8, line 9).

Regarding on claim 3, Bordsen teaches each log record has a log header comprising:

LSN (Log Sequence Number) for storing log sequence (col. 8, lines

14-17);

(TID) (Transaction ID) for storing the identity of the transaction that created the log record.(col. 8, lines 10-13);

previous LSN for storing the identity of the most recently created log by the same transaction (col. 8, lines 14-17);

Type for storing the type of the log record (col. 8, lines 20-24);

Backup ID for storing the relation between the log record and the updated page for use with fuzzy check pointing (col. 8, lines 35-40); .

Page ID for storing the identity of an updated page (col. 8, lines 35-40);

Offset for storing the starting offset of an updated area within the updated page (col. 8, lines 47-49); and

Size for storing the size of the updated area (col. 8, lines 50-52).

Regarding on claim 37, Bordsen teaches one or more memory buffers wherein each generated log record is temporarily stored in any available log buffer and a group of the buffer log records are written together to an arbitrary one of said one or more persistent log storage devices (col. 8, lines 30-45).

5. Claims 4-24 and 26-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bordsen et al. (US. Patent No. 5,193,162) in view of Bohannon et al. (US. Patent No. 6,449,623).

Regarding on claim 4, Bordsen does not explicitly teach checkpointing by occasionally writing the database in the main memory to said one or more persistent back storage devices. However, Bohannon teaches, "during a check point, a dirty pages from the in-memory database image are written to disk" (col. 11, lines 28-30). This teaches the pages from the database images are copied into the storage device. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to modify the teaching of Bohannon into Bordsen because utilizing the check points to copy the database image to the disk would allow the restore of the image of the database before the system failures.

Regarding on claim 5, Bordsen does not teach the step of checkpointing uses the transaction.

However, Bahannon teaches the step of checkpointing uses the transaction (col. 11, line 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to combine the teaching of Bahannon and Bordsen because utilizing the check points to copy the database image to the disk would allow the restore of the image of the database before the system failures.

Regarding on claim 6, Bordsen does not teach the step of checkpointing uses the action consistent.

However, Bohannon teaches the step of checkpointing uses the action consistent checkpointing policy (col. 11, lines 33-37).

Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to combine the teaching of Bahannon and Bordsen because utilizing the check points to copy the database image to the disk would allow the restore of the image of the database before the system failures.

Regarding on claims 7 and 29, Bordsen does not teach the step of checkpointing uses the fuzzy checkpointing policy.

Bordsen does not teach the step of checkpointing uses the fuzzy checkpointing policy (col. 11, lines 33-37).

Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to combine the teaching of Bahannon and Bordsen because utilizing the check points to copy the database image to the disk would allow the restore of the image of the database before the system failures.

Regarding on claims 8 and 30, Bordsen teaches the step of recovering comprises the step of:

Loading the checkpoint database from said one or more persistent backup storage devices into the main memory database (col. 9, lines 39-55); and
Loading the log records from said one or more persistent log storage devices into the main memory database in order to restore the main memory database to the most recent consistent state (col. 9, lines 22-28).

Regarding on claim 9, Bordsen teaches the step of loading the checkpoint database is executed in parallel by partitioning data in said one or more backup storage devices (col. 7, lines 28-29).

Regarding on claims 10 and 32, Bordsen teaches the recovery method is done two passes by separating a redoing pass and an undoing pass (Col. 9, lines 2228).

Regarding on claims 11, 13, 15, 20 and 22, Bordsen teaches reading the log records and replaying the log records are executed in a pipeline (col. 8, lines 61-67).

Regarding on claims 12 and 16, Bordsen teaches reading the log records is executed in parallel by partitioning the log records as well as redoing/undoing the log records (col. 9, lines 22-28).

Regarding on claims 14 and 33, Bordsen teaches replaying the log records is done in one pass (col. 9, lines 22-28).

Regarding on claims 16 and 21, Bordsen teaches reading the log records and redoing/undoing the log records are executed in parallel by partitioning the log records (col. 9, lines 39-55).

Regarding on claim 18, Bordsen teaches filling the main memory database with Os in advance (col. 8, lines 10-13).

Regarding on claims 19 and 31, Bordsen teaches loading the checkpointed database comprises:

Reading the checkpointed database from said one or more checkpointed database) (non-volatile memory) (col. 9, lines 39-55); and

Redoing/undoing the checkpointed database by applying the XOR operation between the checkpointed database and the main memory database (col. 9, lines 22-28).

Regarding on claim 21, Bordsen teaches reading the checkpointed database is executed in parallel by partitioning the checkpointed database as well as playing the backup data (col. 7, lines 28-29).

Regarding on claim 23, Bordsen teaches loading the backup data and of loading the log records are executed in parallel (col. 7, lines 28-29).

Regarding on claim 35, Bodsen teaches the medium is a CD (storage media) (col. 9, lines 24).

Regarding on claim 36, Bodsen teaches the medium is a magnetic tape (Col. 9,-lines 25-26).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Menon et al. (US. Patent No. 5,375,128) Patent date: 12/20/1994.

Nainani et al. (US. Patent No. 6,185,577 B1) Patent date: 02/06/2001.

Loaiza et al. (US. Patent No. 6,618,822 B1) Patent date: 09/09/2003.

St. Pierre et al (US. Patent No. 6,269,381 B1) Patent date: 07/31/2001

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Baoquoc N. To whose telephone number is (703) 305-1949 or via e-mail BaoquocN.To@uspto.gov. The examiner can normally be reached on Monday-Friday: 8:00 AM – 4:30 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene can be reached at (703) 305-9790.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231.

The fax numbers for the organization where this application or proceeding is assigned are as follow:

(703) 872-9306 [Official Communication]

Hand-delivered responses should be brought to:

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2121 Crystal Drive

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Baoquoc N. To

September 28, 2004

JEAN M. CORRIELUS
PRIMARY EXAMINER